

MINUTES
CHIEF OF ENGINEERS' ENVIRONMENTAL ADVISORY BOARD MEETING
Omaha, NE
6 November 2003

1. The Chief of Engineers, **LTG Robert Flowers**, called the Environmental Advisory Board (EAB) meeting to order at 0900 hours, 6 November 2003. The following EAB members were present:

- **Dr. Michael Donahue**, *[affiliation & area of expertise?]*
- **Dr. Matthias Kondolf**, Associate Professor of Geography, University of California at Berkeley, associated with CALFED restoration program
- **Dr. Theodore Hullar**, Cornell University, formerly with New York State Department of Environmental Conservation
- **Dr. Denise Reed**, Professor of Geology and Geophysics, *University of Louisiana (?)*, active in tidal marsh restoration
- **Mr. Kenneth Babcock**, Southern Regional Office, Ducks Unlimited; formerly with Missouri Department of Conservation

Also present were **Mr. Fred Caver**, Deputy Director of Civil Works; and **Ms. Patricia Rivers**, Chief, Military Programs Environmental Division.

2. **WELCOMING REMARKS:**

COL Kurt Ubbelohde, Omaha District commander, welcomed the EAB to his District, thanking them for their participation in field trips and briefings during the previous two days, which he hoped gave members an appreciation of issues in the area. The Missouri River, he said, serves many competing interests, which the Corps attempts to manage equitably. Millions of people keep close watch on this process, and the Board's input is crucial

LTG Flowers added his welcome, and thanked Omaha District for hosting the meeting and arranging the field trips.

3. **USACE STRATEGIC ISSUES:**

Mr. Caver discussed continuing development of the Civil Works Strategic Plan, mandated by the Government Performance & Results Act of 1993. The current plan, he pointed out, was heavily influenced by input from stakeholders, customers and other interested parties, gathered at such venues as the 16 "listening sessions" USACE held around the country in 2000 and the American Water Resources Association's Water Policy Dialogue in Sept. 2002. Common themes that emerged from these meetings included a need for the Corps to be more flexible and collaborative, streamline its business processes, and seek environmentally sustainable solutions. Participants at the meetings generally agreed that the most valuable element the Corps brings to any enterprise is its technical leadership.

The Corps used this input when drafting its Strategic Plan, now out for review by other agencies. The result was the Plan's five goals:

- 1: Provide sustainable development and integrated management of the nation's water resources.
- 2: Repair past environmental degradation and prevent future environmental losses.
- 3: Ensure that projects perform to meet authorized purposes and evolving conditions.
- 4: Reduce vulnerabilities and losses to the nation and the Army from natural and man-made disasters, including terrorism.
- 5: Be a world-class public engineering organization.

HQUSACE, he said, is taking steps to implement the plan while maintaining its focus on the future. One major element involves streamlining business processes, reducing overhead, and providing one level of

review for proposed projects and other activities. This is being accomplished by collapsing the Washington Headquarters and eight divisions into a single headquarters organization in nine locations, a plan known as “USACE 2012” although it will be implemented next year. Under USACE 2012, the current “stovepipe” organization will be integrated into teams supporting the eight regions, interdisciplinary vertical teams, and “communities of practice” for the various specialties employed by the Corps. Leaders of the communities of practice will ensure that all members, throughout the Corps, receive training to stay on the cutting edge of their professions. USACE 2012 is also a recognition by the Corps that it can’t maintain 41 “full service” districts where many employees are underworked, but instead must leverage the expertise of the entire Corps, via modern communication technology, to support missions that may be located far from the employee’s home station. This capability was well used in Corps support to operations in Iraq, where field engineers were able to link via “tele-engineering” to stateside expertise.

The EAB, Mr. Caver suggested, can help the Corps with such strategic issues as defining “environmental sustainability.” It is easy to see, *post facto*, where it has not been achieved, but more difficult to see before undertaking a project how to achieve it. The EAB can also help move the Corps toward integrated watershed management, another key element of the Civil Works strategy. Water supply and quality issues, he predicted, will be constraints on U.S. economic security as they already are in other parts of the world. Returning to a subject addressed at previous EAB meetings, Mr. Caver cited difficulties in evaluating projects. Economic benefits, he said, are visible and can be calculated, but environmental benefits, by their nature, are less so. The Chief of Engineers issued his Environmental Operating Principles and implementation guidance, he said, but additional discussion would be welcome. So would be discussion of disconnects in the regulatory process. Federal requirements are sometimes not consistent with one another, and the result is unnecessary confusion for applicants.

The Board, he concluded, can be of more help to the Corps by considering these and other strategic issues than by focusing on discrete projects, even though projects may be examples of global issues in play. He invited Board members to list 2-3 strategic issues they would consider most worthwhile to address.

LTG Flowers asked the Board to discuss some of the issues Mr. Caver raised after its discussion of independent scientific review. He also introduced Ms. Rivers as head of the new Environmental Community of Practice.

4. INDEPENDENT SCIENTIFIC REVIEW:

Dr. Reed introduced the Board’s recommendations (Appendix A), noting that many were drawn from National Research Council recommendations for peer review and discussions with others on how they conduct independent reviews. The Board arrived at most of its recommendations at a working session in Washington, DC in Sept. 2003, but Dr. Reed said she got additional ideas during the Board’s visit to the bird rearing program at Gavins Point Dam, SD, just before this meeting.

Dr. Hullar recalled the Sept. 2003 working session as being marked by a “spirit of commonality” in which the Board was able to build on Corps and NRC experiences with independent review.

Mr. Babcock pointed out that independent review adds value to Corps projects and activities; it is not there only to serve a watchdog function. It helps the Corps achieve its goal of being more collaborative.

Dr. Reed reviewed the Board’s first recommendation (Appendix A, page 6), noting that Board member **Dr. Mohammed Dahab**, who was unable to attend this meeting, had recommended more precise wording to cover cases where the state of the art for an activity has not been established, or where the Corps anticipates controversy.

Dr. Hullar suggested that the question of when to recommend review be left open.

LTG Flowers explained that commanders always want maximum discretion, but experience shows them that it is often better to call in experts early. He noted that the Water Resources Development bill passed by the House in Oct. 2003 included a dollar amount trigger for independent review.

Dr. Hullar discussed the possibility of the Corps using “embedded scientists,” similar to the embedded journalists assigned to military units in Iraq. It would be more difficult for them to be truly independent, but they could be useful.

Dr. Reed said this concept was addressed in Board Recommendation #5 (see Appendix A).

LTG Flowers said the Corps has used Dr. Hullar’s concept, hiring experts to advise if it was on the right track.

Mr. Babcock said that language in the proposed WRDA should allow discretion to the Chief of Engineers. The person with accountability needs authority. Trying to define the need for independent scientific review by a dollar amount, he said, is not helpful.

Dr. Donahue said that expert reviewers should include social scientists as well as those from the “hard” sciences. The expertise of planners and economists is especially important.

Dr. Kondolf said the cost of independent scientific review could be low in relation to the benefits. He also suggested there could be more than one phase of review as a project proceeds. He likened the process to sending a paper to a scientific journal – he always has a colleague review it first.

Dr. Hullar agreed, saying reviewers can be helpful at the scoping stage. He warned, however, that extending review beyond “costly, complex, controversial or large scale” projects would be “jumping off a ski slope.”

Mr. Caver pointed out that, in considering projects for independent review, the Corps must remember that most Civil Works projects are cost-shared and developed in partnership with local sponsors. He asked what the sponsors’ role would be in selecting projects for review.

Dr. Reed suggested that sponsors provide people for an informal review process separate from the formal process to ensure the review process is not overly time-consuming; but said that sponsors need to recognize that independent scientific review is a necessary part of the project development process.

Dr. Donahue said the dollar threshold for selecting projects for review should be 0. All projects, large and small, need review; otherwise there is always risk that the one project where review wasn’t considered necessary will cause trouble. He also said that all parties to a project should share the cost of the review.

LTG Flowers said the threshold is 0 now, and under the proposed law he could still require review of any project, but would need to justify spending money on such reviews. He liked the idea of multi-stage review, with scientists taking a quick first look at a proposed project. He also suggested that some expensive projects might not contain elements needing review or anything likely to be controversial. An example would be changing to more environmentally friendly turbine blades at hydroelectric plants.

Dr. Hullar suggested the review concept be extended beyond projects under development to include operation of existing projects.

LTG Flowers said this was a great idea. Corps senior leaders now review case studies, and he has requested funds for such “look-back.”

Dr. Reed suggested that selecting which projects need review was not as important as deciding who should conduct them, when and how.

LTG Flowers agreed, although he said that the preceding discussion was useful for its recommendation that experts be brought in early in the project development process.

After further discussion, the Board agreed to leave Recommendation #1 as written.

Dr. Reed then introduced Recommendation #2, dealing with independence of the reviewers. As written, this recommendation says that reviewers should not be selected or employed by the Corps, although the Corps should set pre-qualification standards.

Dr. Donahue pointed out that the terms “independent” and “objective” are not synonymous, and just because someone is in academia does not mean that he/she is either. He then asked what would happen if an independent review came back unfavorable.

LTG Flowers said the review would be part of the public record. If the Corps chose not to follow the recommendation, it would have to explain why to Congress and other interested parties.

Mr. Caver said he hoped matters would never come to that. The proposed WRDA says the final review would be furnished to the Chief.

LTG Flowers said that some have said a complete independent review can only be made after the Corps has made its recommendation, but this would lead to delays in moving the project and could get the Corps and reviewers into a do-loop: recommend, review, change recommendation, more review, etc.

Dr. Reed agreed, saying this issue is addressed in Board Recommendation #7, but said the NRC said that late review is appropriate.

Mr. Babcock said the issue in Recommendation #2 that is bothersome to him is that of accountability. He would like to see language allowing the Corps to approve the reviewers and say they are legitimate.

LTG Flowers said the idea of pre-qualification is helpful in that regard. The Corps can maintain standing lists of experts.

Mr. Caver pointed out that not many people have expertise in much of what the Corps does, but the Corps works with the National Academy of Sciences and other bodies to find experts who could be used as reviewers.

Dr. Reed said the Board's report addresses this issue; she worked with these groups in doing case studies. In cases she was familiar with, a third party selected the experts. Addressing the issue of cost, she said the idea that a review has to cost \$300,000 is ridiculous.

Mr. Babcock said he didn't mean that a third party shouldn't select the reviewers, but did want the Corps to agree that the reviewers are legitimately independent.

Dr. Hullar agreed this was an important point, but he believes the system already has a self-correction mechanism – if the Corps ignores the recommendations of the National Academy of Sciences, it does so at its own risk.

LTG Flowers said that, once an independent third party recommends a review panel, absent some firm grounds to reject an individual member, the Corps should agree to what they recommend. Opponents of Corps activities, he said, hire scientists to reach the conclusions they want, and this is touted in the press as the “best science available,” but it is not independent. Panels used by the Corps would be.

Dr. Reed introduced Board Recommendation #3, saying it supported National Research Council recommendations and that comments would be forthcoming. Recommendation #4 deals with the NRC recommendation that independent review go beyond project planning and design to ensure that projects already in the ground continue to serve their intended purposes – similar to the “look-back” concept discussed earlier.

Dr. Hullar said this was potentially the Board's most important recommendation, since it ties in to the project monitoring discussed at previous Board meetings.

Mr. Caver said such look-backs would also be useful in decisions on where to invest, given competition for funds.

Mr. Babcock said the recommendation ties in to the concept of “adaptive management” discussed at the Board's Oct. 2002 and May 2003 meetings. “Do it and see what happens,” he explained, is not adaptive management; the Corps needs a feedback loop.

LTG Flowers said the recommendation is also in keeping with the concept in USACE 2012 of the Corps becoming a Learning Organization.

Dr. Reed noted that Recommendation #5 - that independent review begin early in the project development process - had already been touched upon in discussion.

LTG Flowers challenged the Board to help him think this recommendation through. He recalled his days as a project officer at the Bonneville II Project in Portland District, where the Corps called in a consultant. When asked if the Corps had forgotten anything on the project, the consultant replied, “probably.”

Dr. Hullar said the second sentence of Recommendation #5 was especially important.

Mr. Caver said he supported involvement of reviewers “early and often.” Early input informs the ultimate decisions, and if the Corps were to engage a new panel later, it would have to spend time and money educating them on what went on before.

Dr. Reed discussed the experiences of the National Technical Review Committee for Coastal Louisiana. This panel is closely engaged with the Corps and others, but there is danger of this engagement getting them too invested in the product – the more embedded the scientists, the less able they are to step back. There is also an NAS panel for Coastal Louisiana, but it faces a very steep learning curve.

Mr. Caver said Coastal Louisiana might not fit the usual pattern. In project development, there are usually three major turning points – defining the “without project” condition, selecting the array of alternatives to consider, and selecting the preferred alternative.

LTG Flowers said he would be informed by his experiences with the project development process.

Sometimes, he said, it would be advantageous to bring in a review panel at any one of the three stages, such as if there were controversy over the preferred alternative.

Dr. Reed said the underlying issue is what the Corps wants the review panel to do. Review late in the process need not look at the entire project, only specific aspects.

Dr. Hullar said that in the Everglades, it would be useful to have a review of the entire restoration program, but it would also be useful to have a panel for specific aspects such as phosphorus removal, an extremely critical part of the process.

Dr. Reed introduced Recommendation #6, dealing with transparency of the review process. “Transparent,” she allowed, might not be the best word, but the review should be available to interested parties and part of the public record.

Dr. Donahue said that, to be transparent, reviews should be publicized; problems have arisen in the past where they were not.

Dr. Reed then proceeded to Recommendation #7, the final one, which called for review to be an iterative process.

LTG Flowers said the process should establish an audit trail and allow people to see how the Corps arrived at its conclusions. He thanked the Board for its recommendations, saying they offer the Corps a way to bring to bear the best that science has to offer in a collaborative process. He promised feedback from the Corps on how it would embrace them.

Dr. Reed said the Board would make modifications as suggested in the day’s discussion and forward them to the Chief.

LTG Flowers stated that the modified recommendations would be part of the Minutes.

5. OTHER DISCUSSION:

Dr. Hullar said the Board is really committed to helping the Corps, and service on it is fun and challenging. He would like to see more discussion meetings between the formal sessions, including mutual sessions where Board members send in possible agenda items.

Mr. Babcock referred to Mr. Caver’s remarks on the importance of Board involvement in Corps strategic planning, agreeing that the Board should have a strategic focus and helping the Corps move away from “solving problems” to “meeting needs.” The Environmental Operating Principles, he said, are a major step in this direction. Much as environmentalists talk about “natural systems,” he said, the Corps and the public need to understand that these systems must be altered to meet human needs – even the need to restore systems to what we believe existed before. In this respect, he said, it is important for the Corps to look at non-structural as well as structural solutions.

Dr. Hullar said that he recognizes that natural systems have been altered, and may need to be altered some more, but he asks, in the words of Dr. Kondolf, “Do we wish to preserve nature with gardens and zoos?”

Mr. Babcock said that, with regard to the Missouri River system, people ask why the Corps today should be driven by decisions made in the 1940s; but in fact, if the Corps had followed the authorities put in place then, the Missouri Basin would be a different place today.

Dr. Kondolf echoed Mr. Caver's call for the Board to assist in defining "environmental sustainability," asking if it was a matter of protecting and restoring natural processes.

LTG Flowers suggested that other agencies and non-government organizations could inform the Corps here, as well as assist in the goal of making Corps processes more collaborative. He recalled a meeting in Peoria, IL, with The Nature Conservancy on properties in the Upper Mississippi River Basin they wanted to see tied together. He brought their approach into the Corps recommendations for the Upper Mississippi River System Environmental Management Program.

Dr. Hullar thanked the Corps and Omaha District for the two days of field trips preceding the meeting, saying each event was extremely valuable to the Board in gaining an understanding of Corps issues. Especially valuable, he said, was the meeting with the Missouri River Mitigation Committee, which touched on the issue of the role of natural processes. The Corps and others, he said, need a vision for the Missouri, one of the most historic rivers in the U.S. and receiving increasing attention with the observance of the Bicentennial of the Lewis and Clark expedition. He suggested the Chief contact the governors of the States in the Basin to formulate such a vision.

LTG Flowers said Dr. Hullar's comments reflect the value of getting people involved.

Dr. Donahue said that 2003 is an exciting time for the Corps. He would like to see a Board meeting in three years, asking how the Corps has done in implementing the ideas discussed today.

6. NEXT BOARD MEETING – LOCATION AND TOPICS:

Mr. Caver asked Board members for suggestions for the next meeting, most likely to be held in May, 2004.

Dr. Hullar said this meeting touched on the importance of collaboration. A region where this is widely practiced is the San Francisco Bay Area, where the CalFed Program is built on interparty relationships, as is work on coastal processes.

Mr. Caver agreed, noting that the Hamilton Wetlands project in the Bay Area is a prime example of how consensus was achieved in turning an ordinary flood control project into an environmental showcase.

Dr. Kondolf said there are two other examples of "green flood control" in the area – Napa and Lower Wildcat Creek. The Board could look at how alternative designs for these projects evolved.

LTG Flowers said he heard a consensus emerging on holding a meeting in Northern California.

Dr. Hullar reminded the Corps not to overload the Board during its three days there.

Dr. Donahue suggested that the Board come to Washington, DC for an informal session in Feb. 2004, to come up with ideas to make the site visits most valuable.

- 7. PUBLIC COMMENT:** None during the meeting. Subsequent to the meeting, however, a written public comment was received from Mr. Jason Skold, Missouri River Program Manager for The Nature Conservancy (TNC) in Omaha, Nebraska. In his statement, he thanked the Board for choosing the Missouri River as the topic of the meeting and the U.S. Army Corps of Engineers Omaha District for hosting it. He also remarked that he believes that TNC can play a role in the near future on the formulation of a plan for Missouri River mitigation by utilizing their "Conservation by Design" approach. This employs an adaptive process of setting priorities, developing strategies, taking action, and measuring success and, he said, is a widely accepted approach to conservation planning. He further stated that he looks forward to facilitating the effective and efficient management of biological resources of the Missouri River.

- 8.** There being no further business, the meeting was adjourned at 1130 hours.

DRAFT – NOVEMBER 6, 2003

APPENDIX A

Chief of Engineers Environmental Advisory Board

Independent Science Review

Background and Introduction

Water resource development projects in the United States are becoming increasingly complex. National goals that include economic development as well as social equity, environmental justice, and environmental restoration combined with already highly altered and managed river and coastal systems mean that few projects of any scale can developed with the skills and experiences within individual Corps' Districts. While in many cases the problems are clear, the solutions are less obvious and the Corps of Engineers is faced with balancing sometimes conflicting local and national goals in the face of limited budgets and public expressions that prolonged studies are less important than on the ground actions. In recent years, there have been repeated calls for increased technical review of the Corps' plans and projects. The Corps' planning process includes some procedures for review of project development documentation, including Independent Technical Review, for the most part this is largely conducted by technicians within the Corps, albeit external to the team conducting the planning studies.

The attention of the Chief's Environmental Advisory Board (EAB) was drawn to the issue of scientific review during their visit to the Jacksonville District in Florida during mid-October 2002 and briefings on Comprehensive Everglades restoration Plan (CERP). The Board discussed the independent science review issues encountered as the Corps' largest environmental restoration project moved toward implementation and recognized that the review issues being dealt with there have or will confront other Corps' Districts. Specifically, the Water Resources Development Act (WRDA) of 2000 had called for independent scientific review of Everglades restoration (observations in Appendix A). Separately, WRDA 2000 also requested the National Academy of Sciences to conduct a study of the procedures for reviewing Corps' planning studies. The effort was managed by the National Research Council (NRC) and its report and recommendations (summarized in Box 1), published in 2002, focus on the Corps' planning process but provide important insights into the general issue of independent science review.

The NRC observed that the preservation of both reviewer independence and credibility requires the Corps to decide whether reviewers can be "affiliated ... with the organization for which the review is being conducted?", if "federal agencies officials beyond the Corps be allowed to serve as reviewers?" and "who will select reviewers?" They caution that "All potential reviewers carry professional and personal biases, and it is important that these biases be disclosed ... (and) determined which biases ... will disqualify prospective reviewers." They also advise that the Corps "should also develop criteria for determining if review panels are properly balanced, both in terms of professional expertise as well as in points of view on the study or project at hand." Of special attention should be those sections addressing the 'type' and 'level' of review, and the 'criteria for evaluating alternative review processes. The full section on criteria is reproduced at Attachment B.

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During the course of the Everglades and subsequent briefings, the EAB has explored the issue of Independent Scientific Review and focused its attention to three issues:

- Who should conduct the review?
- When should it occur?
- How should it be conducted?

Box 1

NRC Recommendations on Review Procedures for Water Resources Project Planning

Reviewers should not be selected by the Corps, and they should not be employed by the Corps.

Reviews should be overseen by an organization independent of the Corps, e.g., NAS.

An Administrative Group for Project Review (AGPR) should be legislatively established within the Corps for two purposes only: determining what needs independent review, and the appropriate level of independent review.

The decision regarding the degree of the review's independence should be open to review upon petition by interested parties.

A Review Advisory Board should be established to provide periodic review of the AGPR mandate, structure, and decision-making processes.

The Corps should be included at some level within all reviews.

Review results should be presented to the Chief of Engineers (COE) before a final decision is made.

Results should be available to the Public.

The COE should respond in writing to each key point in the report of a review panel.

Reviews should be initiated early enough in the Corps' study process so that review results can be meaningfully incorporated into the planning study or project design.

Review panels should not become too strongly attached to their reports and become defenders of their recommendations. The composition of review panels can be changed during the oversight period to avoid this.

Internal review panels should usually consist of a balance in the number of Corps' professional staff and experts independent of the Corps.

In external reviews, the Corps may nominate, but should not select the reviewers.

Reviews should be conducted to identify, explain, and comment upon assumptions that underlie analyses, as well as to evaluate the soundness of models and methods.

A review panel should be instructed to not present a final judgment on whether a project should be constructed or whether a particular operations plan should be implemented, as the Corps is ultimately responsible for this final decision.

Congress should provide resources to the Secretary of the Army to help implement these recommendations.

APPENDIX A

RECENT CORPS' EXPERIENCES

The U.S. Army Corps of Engineers has had many recent experiences with various types of independent review. These expert panels can be broadly categorized into those convened by the National Research Council (a part of the National Academies), and those assembled using external contracted either directly or through a third party by the Corps. These are summarized here with more details provided in Attachment C.

The National Academies

- Committee on Restoration of the Greater Everglades Ecosystem (CROGEE) (<http://www.sfrestore.org/crogee>) -- The South Florida Ecosystem Restoration Task force responded to a long-standing request of its Science Coordinating Team for a peer review program in 1999, when it entered into agreement with the National Academy of Science to establish the Committee on the Restoration of the Greater Everglades Ecosystem (CROGEE). CROGEE is designated to provide scientific guidance to multiple agencies engaged in the restoration of the greater Everglades. In addition to strategic assessments and guidance, the committee provides focused advice. CROGEE has met twelve times through March 7, 2003.
- Louisiana Coastal Area Study – The Ocean Studies Board of the National Research Council (NRC) has been contracted by the State of Louisiana, in partnership with the New Orleans District, to review the Louisiana Coastal Area Study. The panel will evaluate the goals and approaches described in the draft plan being developed to restore coastal Louisiana. Specifically, the committee will address the scientific and engineering analyses behind the strategies outlined in the draft plan, the priorities for implementation of elements within the plan, and evaluate the potential benefits of Louisiana's coastal restoration to the national economy and the nation's interests? The starting date for the project was November 2002 and the original intent was for a final report will be issued approximately 16 months after initiation of the panel's deliberations. Delays in release of the LCA study have resulted in postponement of the NRC panels report..
- The Upper Mississippi -- The U.S. Army Corps of Engineers entered into an agreement with the NRC to conduct a review of the Upper Mississippi River -Illinois Waterway Restructured Navigation Study. The guidelines for restructuring the study were based on recommendations in a February 2001 report by the NRC and input of a Federal Principals Group, consisting of Washington-level representatives from the U.S. Department of Agriculture, U.S. Fish and Wildlife Service, Environmental Protection Agency, the Maritime Administration, and the Corps. The NRC review will be conducted by an expert committee of approximately 13 members with a breadth of expertise and will conduct its review on a parallel path with other study activities and provide input at key study milestones and decision points. The committee met for the first time on September 8, 2003..

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Other Expert Panel Approaches

- Review of Raising the Folsom Dam – The Director of Civil Works expedited an Independent Technical Review (ITR) and Special Analysis of the American River Long Term Study, CA (Folsom Dam Mini-Raise) to address six technical questions. The ITR team, led by HQ, presented their results in a HQ briefing within 4 weeks. When the ITR findings were briefed, five of the six questions addressed were satisfactorily resolved. The COE expedited a special analysis (SA) of the remaining question within two weeks, which led to the Deputy Chief of the Engineering and Construction Division leading a technical team of about thirty members from HQ, South Pacific Division, and the Pittsburgh and Sacramento Districts to perform the special analysis.
- Comprehensive External Independent Review Of Delaware River Main Stem and Channel Deepening Project – The Corps conducted an external independent review (EIR) for the Delaware River deepening project following a General Accounting Office (GAO) review subsequently published as GAO report 02-604, which concluded that the economic analysis of the Delaware River channel-deepening project contained a number of material errors. To expedite the review process, the Corps contracted through an existing Institute for Water Resources indefinite quantity contract with a private, for-profit contractor. The contractor was encouraged to engage outside experts in economics and maritime navigation to complete the review. Three experts were selected by the contractor with little input from the Corps. The EIR panel tasks included providing: 1) an initial review assessment of the reanalysis; 2) a final review following comments from the Corps; and 3) a summary of overall review conclusions and recommendations.
- Review of the Columbia River Improvement -- In August 2002, the Corps convened two technical review teams to evaluate the reasonableness of a reassessment of the economic and environmental information reported in the Integrated Feasibility Report and Environmental Impact Statement for the Channel Improvement Project. The outcome of the technical review process was a written report. Two important criteria considered were: (1) that an objective review be completed and (2) the review be performed in a timely manner. The technical review process was facilitated by a neutral, non-profit organization (RESOLVE). The Corps selected the review panel, with the facilitator interviewing the prospective panelists to determine their interest, availability, qualifications and to gauge their objectivity.
- National Technical Review Committee, (NRTC) – The NRTC was formed in April 2002 by the New Orleans District of the U.S. Army Corps of Engineers as an scientific technical committee to assist the Corps and the State of Louisiana to develop the Louisiana Comprehensive Area Study (LCA). The purpose of the NRTC is to enhance technical quality and scientific credibility in the LCA study. The NRTC is composed of nine technical experts to provide a geographically and technically diverse suite of national expertise, largely selected to exclude federal and state employees. NRTC selection was determined after a list of candidates was prepared in February 2002 by an ad hoc working group chaired by the Corps' Engineer Research and Development Center, who also provide staff support to the NRTC. The NRTC has met six times as of July 2003.

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DISCUSSION

The Chief of Engineers Environmental Advisory Board (EAB) is generally in accord with the recommendations of the NRC Report on Review Procedures for Water Resources Project Planning. Further, the EAB recommends that such procedures be extended to address not only the pre-implementation planning phase of a project, but to embrace a cradle-to-grave life cycle concept. This is essential as implemented projects, especially those that are part of a system of projects, will likely be constantly revisited to assure that they are being operated in accord with changing water resources realities. The EAB identified the several points relevant to the consideration of independent scientific review.

- **Who should conduct the review?**

On this issue we believe that review panels should be convened by entities that are independent, free from conflict, not advocates or opponents, and with experience in the administration of peer review. This does not limit the Corps to the National Academies. Many institutions with these attributes exist around the country, many with knowledge of regional issues that could be of particular benefit in assembling review panels. For example, the California Council for Science and Technology might meet these criteria. Concerns regarding the responsiveness and timeliness of some review bodies are real, and planning scientific review into project development on a more routine basis will alleviate the need for ‘emergency’ reviews and allow review convenors greater ability to be responsive to the Corps’ needs.

- **When should it occur?**

Generally speaking, pre-implementation planning for a project, which includes various studies, analysis, and research, should seek to include embedded external scientists in the process as early as possible, to include the scoping process. This is an important concept that can greatly add to the scientific integrity of the process. Although this issue is not specific to independent science review, the EAB believes that by building scientific integrity into projects from the beginning, many of the problems currently being identified in later review stages can be avoided. Involving embedded scientists can help assure that the Corps is guided to thoroughly incorporate the interests and views of all major stakeholders. It should be incorporated by the Corps separate from the need to perform independent science review of the final product.

Planning for the Post-implementation phase of a project should include plans for an ongoing monitoring activity and as-built reviews. The Corps must evaluate project characteristics, outputs and effectiveness relative to project goals. Such evaluations are an important part of improving Corps’ planning and implementation, but are vital to any project implemented in an adaptive management framework or in the face of some uncertainty regarding environmental conditions. Subjecting such evaluations to independent scientific review, especially when they are part of adaptive management, is crucial to maintaining stakeholder support for changing management approaches or structure operations post project implementation.

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- **How should it be conducted?**

The EAB supports many of the recommendations of the NRC panel on this issue. If the Corps is to conduct independent scientific review as a routine part of its procedures, standards regarding independence of the reviewers and the process must be maintained. Critically important is that the review and response process must be transparent. The EAB agrees with the NRC that the review should be directed to the Chief of Engineers. However, there should be iterations of review and response between the Corps and reviewers as necessary to ensure a thorough understanding of any review recommendations.

APPENDIX A

RECOMMENDATIONS

The EAB recommends that:

- Independent review by objective outside experts be applied to those projects that are more costly, complex, controversial, or large scale;
- Reviewers should be neither selected nor employed by the Corps.
- The recommendations provided in the National Research Council's report, "Review Procedures for Water Resources Project Planning" be incorporated by the Corps (Box 1).
- The NRC recommendations be extended to address post implementation processes to embrace the life cycle nature of the Corps' business.
- Engaging external scientific expertise in the project development process as early as possible will be of great benefit to Corps' planners and improve products. This is separate from, and in addition to, the need to perform independent science review of the final product.
- It is critically important that it ensure that the review and response process be transparent.
- Review procedures should provide for iterations of review and response between the Corps and reviewers as necessary.

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CERP OBSERVATIONS

- In the absence of a guiding and universally agreed upon scientific and networked review process, entities may assume the review mission and produce reports or reviews of reports with questioned utility and, thereby, lack of acceptance of same.
- The debate should not focus on who is best suited to perform the independent scientific review, but on how it should be performed.
- A widely accepted process or methodology to conduct independent scientific review is needed that has the following characteristics:
 - It should not be vested in only one place or in one organization.
 - The process methodology should be designed so it may be administered independent of the originator of the work under review.
 - “Independent” and the context of this independence must be defined. Is independence based on the characteristics of individuals, an agency or an association with an organization? Are there other criteria and principles in play that should be described?
 - The process should rely on the strategic selection of reviewers and not be self-selecting. It should not be a process that requires agency representation as a driving factor in the selection of reviewers.
 - The process must be designed to let peer reviewers succeed (proper amount of time, funding, proper framing of questions and issues to be addressed, and appropriate background information).
 - The subject matter suitable for an independent review should be identified, such as: models, precedent setting scientific reports, emerging technologies, innovative approaches, policy implications (these may be scientific as well as social and economic issues), and issues that address uncertainty.
 - The process should have provisions for various levels or rigors of review. In other words, the effort applied should be suitable or matched to the issue in question.
 - The process should have reiterative feedback loops that permit communication between the reviewers and the originators of the items under review. Disagreement may remain between those performing the review and authors of the reviewed items. However, the process must be accepted as a fair forum to reveal legitimate differences in professional opinion.

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Additional Observations

- Characteristics to consider when designing an effort are that the review forum may include ad hoc panels, or standing pool(s) of experts. These configurations may include experts independent of the project, its agencies and affected parties as well as individuals that are affiliated with these related groups. What will ultimately be submitted to the process will be determined by the technical and policy needs or concerns raised by the stakeholder organizations working in related science development and utilization arenas.
- When examining existing stakeholder groups as possible ones that might be selected to implement the process, some things to consider are:
 - Examining past actions of the group to assure that they are positioned to meet the timeframes required for most applications or review needs.
 - Is the group designed to accommodate the focus and specific scientific rigors required to accomplish the entire peer review mission.
 - Will the group member's organizational affiliations serve to erode a perception of independence.

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ATTACHMENT B

NATIONAL RESEARCH COUNCIL
CRITERIA FOR EVALUATING ALTERNATIVES

”Several different review processes could be formulated for review of Corps’ water resources project planning studies. Several different criteria must be considered in weighing these alternate approaches to review. The degree of independence from influence by the Corps of Engineers is a preeminent criterion, as it is strongly related to a review's credibility. The process by which reviewers are nominated and selected is also important, as it will affect a review's independence and credibility. The affiliation(s) of the group or individuals selecting the reviewers is a key issue, as are the affiliations and backgrounds of the reviewers themselves. Issues related to conflicts of interest and biases may arise in connection with review processes within federal agencies such as the Corps of Engineers, and care must be taken to minimize these concerns. There is also the challenge of selecting review panels that are viewed as credible and balanced, but that also have adequate knowledge of the Corps' often highly complex planning guidance and analytical methods.

Independence of review begins with the nomination and selection of reviewers. Credibility of this process does not necessarily require that the selection process be totally divorced from the Corps for all decisions. For example, the Corps should be allowed to nominate panelists for an independent review panel-but it should not select them. In fact, some degree of participation by the Corps in the review will generally help increase the review's usefulness, even in fully independent reviews. The Corps should help inform the review panel of a planning study's key assumptions and methods, and it should discuss with the panel ways in which the panel's findings might be most useful. The fact remains, however, that in large, controversial projects, a review's credibility will be a function of the distance between the reviewer selection process and the Corps. To reiterate, the two most important considerations in establishing a review panel's independence are (1) who selects the reviewers, and (2) who the reviewers are.

If the purpose is to improve the quality of Corps’ water resources project planning studies, the results of review will be more useful to the Corps before it prepares a final recommendation on a planning study. Comments from reviewers can be addressed before a final project recommendation is made public. If a review is primarily intended to provide to Congress and the public a fully independent judgment about a project proposed by the Corps, the review could be deferred until after the Corps’ recommendation.

In addition to informing Congress and the public, the review should also assist the Corps in the process of reaching its final recommendation. Results of review should thus be directed to the Corps-usually to the Chief of Engineers-before the Chief develops a final decision. This recommendation does not imply that results of a review should be provided confidentially to the Chief of Engineers. In fact, review panel reports should be made public and should be incorporated in the record of the project that is sent to the Office of Management and Budget (OMB) and Congress. The Chief of Engineers should also address each key finding or recommendation in the report, either by agreeing and stating what steps will be taken in response, or by disagreeing and rebutting the comments.

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Reviews should not duplicate other review processes required by law or included within normal executive functions of the government. The Fish and Wildlife Coordination Act of 1934, the National Environmental Policy Act, and other statutes require external review of Corps' projects by select parties. Comments from other agencies may identify the need for review to provide advice on particular issues, but the review should not duplicate studies of other agencies. In addition, OMB routinely reviews Corps' planning studies for consistency with Administration goals and priorities before those studies are included in the budget proposed by the Administration.

The group that selects reviewers for Corps' projects should be knowledgeable of the Corps' mission, its statutory authorities and related administrative regulations, and other planning and evaluation procedures. The Corps operates within authorities and directives given to it by Congress, and it has a set of guidelines and regulations that provide a decision-making framework. That framework leaves considerable discretion to Corps' staff as they execute the various steps in the planning process. Review panels should thus include, or have available as a resource, experts familiar with the guidance and regulations under which the Corps operates. To ensure that review panels have this knowledge, the group that selects reviews either should be familiar with the community of external water resources experts who have knowledge of the Corps' decision-making and planning framework, or should be able to draw on individuals who can provide the needed expertise.

Reviewers may find themselves in disagreement with the results of Corps' planning studies. These results may have been driven by specific regulations or guidelines, or they may have resulted from staff exercising discretion within the regulations and guidelines. Reviewers should aim to draw distinctions between criticisms of the regulations and guidelines and criticisms of how well the Corps conformed to planning guidance.

Finally, any arrangement for implementing a review process should consider the implications for staff and supporting resources. Some reviews may entail a greater number of reviewers than others, some reviews might be conducted by videoconferencing or by mail, and some meetings might employ a professional facilitator. Some arrangements might entail a large staff with the full complement of skills necessary to review projects in detail, while others may be more selective in the aspects of decisions that will be reviewed.

As it moves to implement a more thorough and credible review process to meet contemporary and future water resources management challenges, the Corps should consider a wide variety of criteria and options. In creating an institutional mechanism to help facilitate a revised review process, the Corps should ensure that the following functions, responsibilities, and capabilities are established for the review process: recruit and maintain quality review panels, gather information from stakeholders, prepare high-quality draft feasibility studies in a timely fashion, arrange for external and internal reviews, receive the Corps' responses to review recommendations, and follow up with inquiries regarding Corps' actions based on review recommendations, where appropriate. Full coverage of these items will require a significant and sustained level of resources."

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U.S. ARMY CORPS OF ENGINEERS
CURRENT EXPERINECES

- **The National Academies in Louisiana** – Louisiana Coastal Area Study – The Ocean Studies Board of the National Research Council has been contracted by the State of Louisiana, in partnership with the New Orleans District, to review the Louisiana Coastal Area Study. The panel will evaluate the goals and approaches described in the draft plan being developed to restore coastal Louisiana. Specifically, the committee will address the following questions: 1) Are the strategies outlined in the draft plan based on sound scientific and engineering analyses and are they appropriate to achieve the goals articulated in the plan? What other approaches might be considered? 2) Are the priorities for implementation of elements within the plan appropriate? How might these elements be phased in over time? 3) What major questions need to be answered to support implementation of the plan? How can these information gaps be filled? 4) In light of the substantial financial resources that would be required to implement the plan, what are the potential benefits of Louisiana's coastal restoration to the national economy and the nation's interests?

The starting date for the project was November 2002 and the original intent was for a final report will be issued approximately 16 months after initiation of the panel's deliberations. Delays in release of the LCA study have resulted in postponement of the NRC panels report..

- **The National Academies in the Upper Mississippi** -- The U.S. Army Corps of Engineers entered into an agreement with the National Research Council (NRC) to conduct a review of the Upper Mississippi River -Illinois Waterway Restructured Navigation Study. The feasibility study for improvements to the waterway system was initiated in 1993 but was significantly restructured in 2001 in response to concerns over the direction of the study and associated public controversy. The guidelines for restructuring the study were based on recommendations in a February 2001 report by the NRC and input of a Federal Principals Group that the Chief of Engineers established to provide study direction and guidance. The Principals Group consists of Washington-level representatives from the U.S. Department of Agriculture, U.S. Fish and Wildlife Service, Environmental Protection Agency, the Maritime Administration, and the Corps. The restructured study is focused on both the need to achieve navigation efficiency and ecological integrity with a goal of an environmentally sustainable navigation system. The NRC review will be conducted by an expert committee of approximately 13 members with a breadth of expertise including aquatic ecology, agricultural and transportation economics, water resources planning, systems engineering, public policy, econometrics, transportation, watershed science, hydrologic engineering and system operations. Qualified committee members will likely come from academia, industry, consulting, government, and non-governmental organizations. The committee will conduct its review on a parallel path with other study activities and provide input at key study milestones and decision points. The independent review will be conducted generally in

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accordance with the NRC recommendations in its recent report Review Procedures for Water Resources Project Planning and will help assess the effectiveness of independent review for large controversial studies. The committee met for the first time on September 8, 2003..

- **National Academy of Sciences - Committee on Restoration of the Greater Everglades Ecosystem (CROGEE)** (<http://www.sfrestore.org/crogee>) -- The South Florida Ecosystem Restoration Task force was established by section 528(f) of Public Law 104-303, the Water Resources Development Act of 1996, enacted October 12, 1996. Agreement Developed with the National Academy of Science: It responded to a long-standing request of its Science Coordinating Team for a peer review program in 1999, when it entered into agreement with the National Academy of Science to establish a review group, the Committee on the Restoration of the Greater Everglades Ecosystem (CROGEE). A Science Coordinating Team liaison group was established to help brief and to assist the Committee. CROGEE is designated to provide scientific guidance to multiple agencies engaged in the restoration of the greater Everglades. The committee provides a scientific overview and technical assessment of the many complicated, inter-related activities and plans that are occurring at the federal, state and nongovernmental levels. In addition to strategic assessments and guidance, the committee provides focused advice on topics of importance to the restoration efforts when appropriate. CROGEE has met twelve times through March 7, 2003.
- **Use of Outside Experts to Review raising the Folsom Dam** – The Chief of Engineers (COE) authorized preparation of an After-Action Report to identify and record the lessons learned from performing an Independent Technical Review (ITR) and Special Analysis of the American River Long Term Study, CA (Folsom Dam Mini-Raise), and to make recommendations regarding similar reviews in the future. The feasibility report recommended raising the existing Folsom Dam by seven feet to add flood control storage, and thereby reduce the risk of flooding in the city of Sacramento, California. While finalizing the Chief's Report to Congress, the COE received a letter from Congressman Don Young (R-AK) which questioned, (1) the technical adequacy of the design, (2) the accuracy of the cost estimate and (3) the advisability of signing the Chief's Report before his questions were resolved. Therefore, the Director of Civil Works expedited an ITR with emphasis on resolving the questions from Mr. Young, and he had the ITR team present their results in a HQ briefing within 4 weeks. HQ was given overall responsibility for leading the ITR. The engineering firm, Quest Structures, was selected to perform the ITR based on their outstanding expertise in dam safety, seismic design, and rock mechanics; their availability (Louisville District had an existing IDIQ contract with the firm); and the Corps' previous work experience with this contractor. Several other tasks proceeded simultaneously: (1) The scope of work and government cost estimate were developed by HQ; (2) Louisville District permitted Sacramento District to negotiate the IDIQ contract with Quest Structures; Quest Structures was asked to initiate the ITR immediately while the IDIQ contract was being negotiated; the ceiling on the IDIQ contract was increased to support the estimated cost of the work; (4) copies of the feasibility report, engineering appendix and supporting material were mailed to Quest Structures; (5) Quest Structures recruited a rock mechanics expert and a cost engineering expert from Project Time and Cost, Inc. to perform the ITR. When the ITR findings were briefed, five of the six questions raised by Congressman Young were satisfactorily resolved. The remaining question, the cost of stabilizing the dam to perform the Mini-Raise, was not addressed because the contractor did not have sufficient time to evaluate

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this issue. The Deputy Director of Civil Works met with HQ staff and announced the Chief's intentions to expedite a special analysis (SA) of the remaining question within two weeks, and to solicit suggestions on how best to proceed with this analysis. The result was to have the Deputy Chief of the Engineering and Construction Division lead a technical team of about thirty members from HQ, South Pacific Division, and the Pittsburgh and Sacramento Districts to perform a special analysis of the cost for stabilizing the dam. The team was composed of senior members with extensive expertise in dam engineering (structural, geotechnical, engineering geology, and seismic analysis and design), and Quest Structures provided additional technical and cost estimating support, and a concurrent, independent technical review of the results. HQ Public Affairs Office prepared a communications strategy to respond to media questions when the special analysis was completed and the Chief's Report was signed. The Special Analysis Team completed their report ten days after convening in the Sacramento District and forwarded it to HQ. The COE signed the Chief's Report to Congress shortly thereafter. HQ PAO, with support from CESP and CESPK, executed the communications plan. Subsequently, the Deputy Director of Civil Works signed a letter to Congressman Young describing the findings of the ITR and the results of the SA. Lessons Learned can be consolidated into three main points: (1) Our ability to respond to the Chief's requirements by identifying and assembling a superbly qualified team should not be overlooked or underestimated; (2) We need to focus on the basic problem that triggered the need for such an urgent response and intense effort. The difficulty we experienced in answering Mr. Young's questions are an example of an ineffective Independent Technical Review process. The dam stability problem raised during the ITR performed by the consultants should have surfaced much earlier in the planning phase for the Mini-Raise, and the work performed by the SAT could have been readily completed before the feasibility report left the district. Doing effective ITR in the districts is common sense and requires a willingness to follow establish policy contained in ER1110-2-1150 (13 August 1999). Until this is the norm, we will remain captive to random repetitions of this event and next time we probably will not be as fortunate; and (3) Finally, we were successful because we were not only good, but we were extraordinarily lucky. Here's why: (a) The controversy, political sensitivity, and technical complexity involved in this project demanded that we engage expert consultants with credentials that were of the highest caliber and that they all agreed to accommodate our urgent need for almost totally dedicated effort on such short notice; (b) We were equally lucky that Louisville District had just completed an IDIQ contract with Quest Structures. Our usual contracting procedures would not have worked within our expedited timeframe; and (c) We were very lucky that the field geologist during the construction of Folsom Dam had done a superb job of mapping the foundation and describing the foundation treatment. Having this excellent source of data available was the key to being able to generate the composite foundation map for our Special Analysis Report in just a few days. The composite foundation map was one of our essential tools in justifying a cost estimate consistent with a Most Probable Case scenario and not with a Worst Case scenario. We should not deceive ourselves that we would be equally lucky in all other districts, or even on other dams in CESPK. We were lucky that we had the expertise in HQ to lead the SAT. Our consultants were not able to free themselves from other commitments within this two-week window of opportunity. The recommendation was to fix the ITR process by requiring districts to fully comply with ER1110-2-1150. Fixing the ITR process requires the following actions: (a) Educate the districts about the requirements of an ITR and ER1110-2-1150; (b)

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Require that each decision document include an ITR certification in accordance with ER1110-2-1150 signed by the appropriate functional chiefs and project manager; (c) Clearly state our intention to return all decision documents that are submitted without proper certification; (d) Emphasize the value of using regional technical resources to accomplish an effective ITR; and (e) Incorporate the lessons learned from the last Command Staff Inspection the North Atlantic Division, focused on ITR and the Quality Control/Quality Assurance process.

- **Use of Outside Experts - Comprehensive External Independent Review Of Delaware River Main Stem and Channel Deepening Project** -- At the request of Congress, the General Accounting Office (GAO) conducted a review of the Delaware River deepening project, which was subsequently published as GAO report 02-604. This report concluded that the economic analysis of the Delaware River channel-deepening project contained a number of material errors. Among the GAO recommendations were that the Corps should prepare a new and comprehensive economic analysis of the project's benefits and costs and engage an external independent party to review the revised economic analysis to ensure that it accurately and fairly represents the expected benefits and costs of the proposed project. To meet the external independent review (EIR) recommendation, the Corps contracted through an existing Institute for Water Resources indefinite quantity contract with a private, for-profit contractor. The IWR contract was used to expedite the review process. The contractor was encouraged to engage outside experts in economics and maritime navigation to complete the review. Three experts were selected by the contractor with little input from the Corps. The EIR panel tasks included providing: 1) an initial review assessment of the reanalysis; 2) a final review following comments from the Corps; and 3) a summary of overall review conclusions and recommendations. A significant procedural problem during the EIR was that "final report" was not available to the EIR panel to review at the time. Additionally, the panel found that the reanalysis report "...did not yet provide a sound basis for Federal investment decision-making." Faced with this conclusion, the Corps conducted additional analyses to address the EIR panel concerns and produced a second comprehensive reanalysis report. The same panel was then engaged to review the second reanalysis. The panel found that the analysis still needed specific corrections. However, it concluded that if the corrections were made that the report would "...provide a reliable basis for economic justification..." for the project. At this point a third party pointed out some facts and issues not adequately considered in the second reanalysis. Some of the concerns were related to the needed corrections noted by the EIR panel although some were in addition. This resulted in a third reanalysis and a third EIR panel review that is currently underway.
- **Use of Outside Experts to Review the Columbia River Improvement** -- In August 2002, the Corps convened two technical review teams to evaluate the reasonableness of a reassessment, conducted between January and June 2002, of the economic and environmental information reported in the Integrated Feasibility Report and Environmental Impact Statement for the Channel Improvement Project. The process was at various points open to the public and the technical review process was facilitated by a neutral, non-profit organization (the facilitator was Robert Fisher from RESOLVE). The reviewers evaluated (1) the reasonableness of the assumptions and overall conclusions of the benefits and costs analysis of the 43-foot channel, and (2) whether the data were used properly in the overall analysis. The outcome of the technical review process was a written report, published

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September 9, 2002. Two important criteria considered were: (1) that an objective review be completed and (2) the review be performed in a timely manner. Use of the National Academy of Sciences was not considered practical given the Academy's long time frame for conducting evaluations and relatively high costs. Also, their review functions are usually focused on large-scale scientific questions of national importance rather than project specific questions such as the accuracy of an economic justification. Other approaches for the review included: use of the Northwest Power Planning Council's Independent Economic Advisory Board, professional societies, consultants, and Corps or independent selection of a review panel. While the Independent Economic Advisory Board is considered a respected group, their lack of expertise in the navigation arena caused the Corps to look at another option. The Corps selected the review panel, with the facilitator interviewing the prospective panelists to determine their interest, availability, qualifications and to gauge their objectivity. The facilitator also sought out comments from a variety of interest groups and community leaders for their opinions regarding this approach. Their comments helped to shape the approach designated for use in this evaluation. Each panel had at least three members (the benefits panel had four) qualified to assess the technical adequacy of the benefits and cost analyses and to provide an objective review. Qualifications of Benefit Review Team members included demonstrated expertise in deep draft navigation (grains, container shipping), inland navigation, knowledge of navigation's role in the Pacific Northwest regional economy, and a general understanding of the water resource policies and procedures used in navigation analyses. Qualifications of Cost Review Team members included demonstrated expertise in navigation channel construction, operation and maintenance, cost estimating, and knowledge of the cost estimating software. The Corps incorporated many of the panel's comments in the Final Supplemental Integrated Feasibility Report and Environmental Impact Statement. Overall, both the Cost Panel members and Benefit Panel members were satisfied with the Corps' response to their comments.

- **National Technical Review Committee, (NRTC)** – The NRTC was formed in April 2002 by the New Orleans District of the U.S. Army Corps of Engineers as an scientific technical committee to assist the Corps and the State of Louisiana to develop the Louisiana Comprehensive Area Study (LCA). The purpose of the NRTC is to enhance technical quality and scientific credibility in the LCA study. The NTRC is composed of nine technical experts to provide a geographically and technically diverse suite of national experts, selected to exclude federal and state employees. NRTC selection was determined after a list of candidates was prepared in February 2002 by an ad hoc working group chaired by the Corps' Engineer Research And Development Center. Members included representatives from the New Orleans District, EPA, USGS, Louisiana DNR, academic institutions and the Coalition to Restore Coastal Louisiana. The NRTC has met six times and is scheduled to meet again during 3-5 November 2003.